

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2026
(Fifth Semester)

Branch – BIOTECHNOLOGY

**MAJOR ELECTIVE COURSE-I : INDUSTRIAL AND MICROBIAL
TECHNOLOGY**

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Which technique is not a strain improvement method? a) UV-induced mutation b) Recombinant DNA technology c) Steam sterilization d) Protoplast fusion	K1	CO1
	2	Continuous culture in a tower fermentor is mainly advantageous because: a) It requires no inoculum b) It maintains microorganisms in exponential growth phase for long periods c) It produces less heat d) It eliminates the need for aeration	K2	CO2
2	3	Which of the following is a carbon source in fermentation media? a) Ammonium sulfate b) Peptone c) Yeast extract d) Molasses	K1	CO2
	4	Using whey (cheese industry waste) as a substrate in fermentation is an example of: a) Genetic engineering b) Batch fermentation c) Biowaste valorization (reuse of waste for product development) d) Downstream processing	K2	CO2
3	5	Which method is used for removing microbial cells from fermentation broth? a) Chromatography b) Centrifugation c) Lyophilisation d) Crystallisation	K1	CO1
	6	D-value in thermal death kinetics represents: a) Time to kill 90% of microbes at a given temperature b) Temperature increase to reduce D-value by 1 log c) pH at which microbial growth stops d) Substrate utilization rate	K2	CO2
4	7	Which microorganism is primarily used for citric acid production? a) Lactobacillus spp b) Aspergillus niger c) Saccharomyces cerevisiae d) Streptomyces griseus	K1	CO2
	8	Why is <i>Aspergillus niger</i> preferred over bacteria for citric acid production? a) It grows faster than bacteria b) It produces less foam c) It can ferment lactose anaerobically d) It produces citric acid extracellularly and tolerates low pH	K2	CO3
5	9	Which starter culture is used in yoghurt production? a) Lactococcus lactis b) Saccharomyces cerevisiae c) Lactobacillus bulgaricus and Streptococcus thermophilus d) Pseudomonas fluorescens	K1	CO1

Cont...

	10	Why is anaerobic fermentation preferred for ethanol production using yeast? a) It allows conversion of sugars to ethanol efficiently b) It prevents contamination c) It increases protein content d) It produces antibiotics	K2	CO2
--	----	--	----	-----

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain the importance of inoculum development in ensuring successful large-scale fermentation	K 2	CO2/ CO3
		(OR)		
	11.b.	Describe how foam formation can affect a fermentation process and how it is controlled in industrial fermenters?		
2	12.a.	Explain the advantages and disadvantages of submerged fermentation (SmF).	K2	CO3
		(OR)		
	12.b.	Discuss the importance of continuous culture in industrial biotechnology.		
3	13.a.	Explain the principle and application of centrifugation in removing microbial cells from fermentation broth.	K2	CO2
		(OR)		
	13.b.	Explain the process of cell disruption for intracellular product recovery and mention mechanical and non-mechanical methods.		
4	14.a.	Explain the microbial production of vitamin C, mentioning key microorganisms, substrates, and recovery steps.	K2	CO2
		(OR)		
	14.b.	Discuss the production of protease enzymes using microbial cultures and compare submerged vs solid-state fermentation.		
5	15.a.	Explain the microbial production of gibberellin through microorganism, and its applications in agriculture.	K 3	CO 3
		(OR)		
	15.b.	Compare and contrast beer and wine production in terms of microorganism, substrate, fermentation conditions, and product recovery.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Compare and contrast the working principles, advantages, and limitations of air-lift fermentors and stirred tank bioreactors	K4	CO5
2	17	Design a safe sterilization strategy for large-scale fermentors and justify your approach.	K4	CO5
3	18	Compare and contrast solid-liquid separation techniques (precipitation, membrane processes, chromatography).	K4	CO5
4	19	Compare and contrast the production of citric acid and lactic acid in terms of microorganisms, substrates, fermentation type.	K4	CO5
5	20	Examine the effect of environmental conditions on mushroom fruiting and yield. How can these parameters be optimized in an industrial setup?	K4	CO5

Z-Z-Z END